

CHENMKO ENTERPRISE CO.,LTD

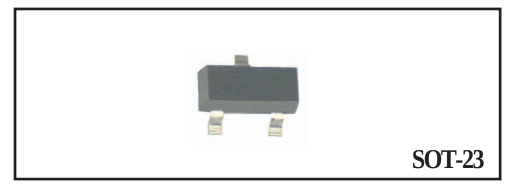
CH3904PT

Lead free devices

SURFACE MOUNT

NPN Switching Transistor

VOLTAGE 40 Volts CURRENT 0.2 Ampere



APPLICATION

* Telephony and proferssional communction equipment.
* Other switching applications.

FEATURE

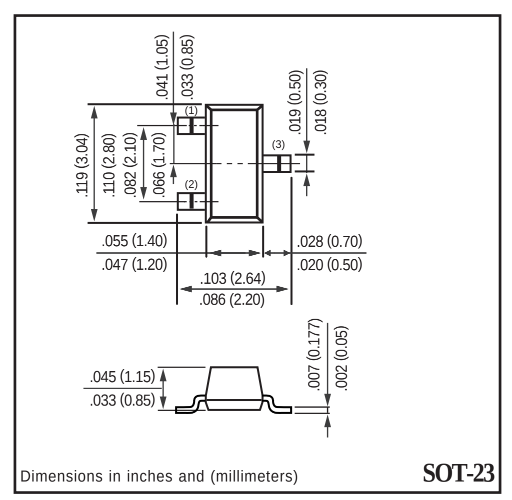
* Small surface mounting type. (SOT-23)
* Low current (Max.=200mA).
* Suitable for high packing density.
* Low voltage (Max.=40V) .
* High saturation current capability.
* Voltage controlled small signal switch.

CONSTRUCTION

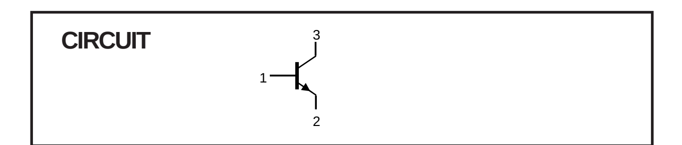
* NPN Switching Transistor

MARKING

* s1A



CIRCUIT



LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	6	V
I_C	collector current DC		–	200	mA
I_{CM}	peak collector current		–	200	mA
I_{BM}	peak base current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	330	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Note

1. Transistor mounted on an FR4 printed-circuit board.

RATING CHARACTERISTIC CURVES (CH3904PT)

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	500	K/W

Note

1. Transistor mounted on an FR4 printed-circuit board.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise speciÞed.

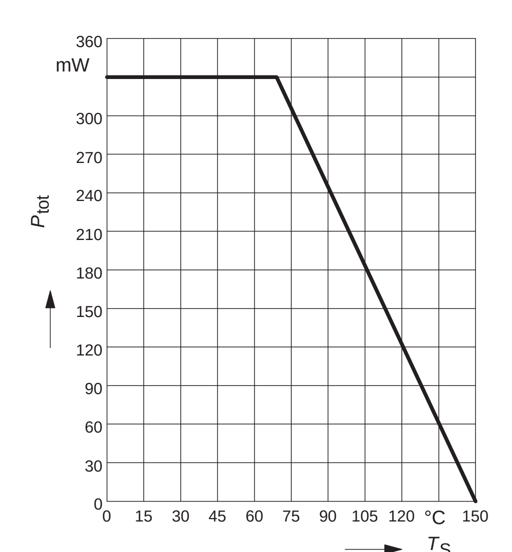
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 30$ V	–	50	nA
I_{EBO}	emitter cut-off current	$I_C = 0$; $V_{EB} = 6$ V	–	50	nA
h_{FE}	DC current gain	$V_{CE} = 1$ V; note 1			
		$I_C = 0.1$ mA	60	–	
		$I_C = 1$ mA	80	–	
		$I_C = 10$ mA	100	300	
		$I_C = 50$ mA	60	–	
		$I_C = 100$ mA	30	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10$ mA; $I_B = 1$ mA	–	200	mV
		$I_C = 50$ mA; $I_B = 5$ mA	–	300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10$ mA; $I_B = 1$ mA	650	850	mV
		$I_C = 50$ mA; $I_B = 5$ mA	–	950	mV
C_c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = 5$ V; f = 1 MHz	–	4	pF
C_e	emitter capacitance	$I_C = i_c = 0$; $V_{BE} = 500$ mV; f = 1 MHz	–	8	pF
f_T	transition frequency	$I_C = 10$ mA; $V_{CE} = 20$ V; f = 100 MHz	300	–	MHz
F	noise Þgure	$I_C = 100$ µA; $V_{CE} = 5$ V; $R_S = 1$ kΩ; f = 10 Hz to 15.7 kHz	–	5	dB
Switching times (between 10% and 90% levels);					
t_{on}	turn-on time	$I_{Con} = 10$ mA; $I_{Bon} = 1$ mA; $I_{Boff} = -1$ mA	–	65	ns
t_d	delay time		–	35	ns
t_r	rise time		–	35	ns
t_{off}	turn-off time		–	240	ns
t_s	storage time		–	200	ns
t_f	fall time		–	50	ns

Note

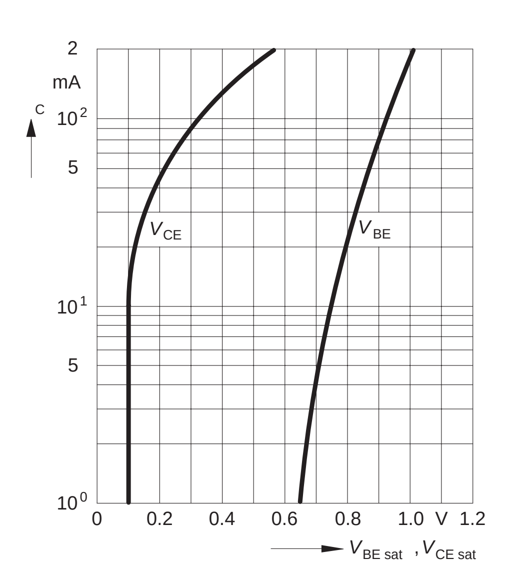
1. Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

RATING CHARACTERISTIC CURVES (CH3904PT)

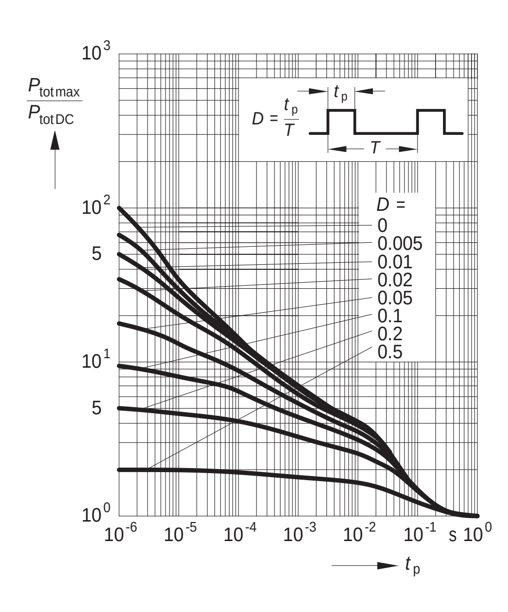
Total power dissipation $P_{tot} = f\,(T_S)$



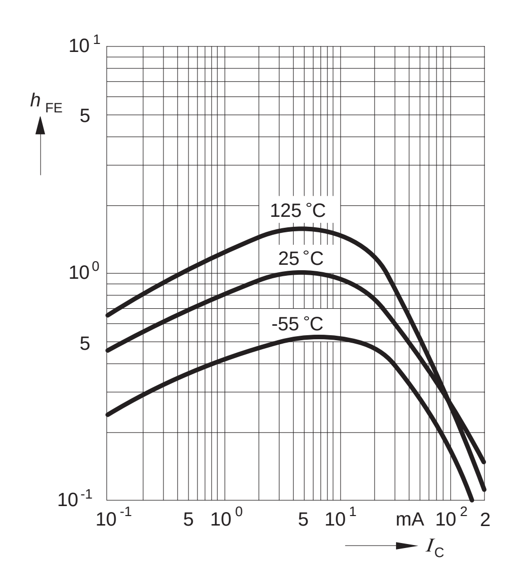
Saturation voltage $I_C = f\,(V_{BEsat}, V_{CEsat})$
$h_{FE} = 10$



Permissible pulse load
$P_{totmax} / P_{totDC} = f\,(t_p)$



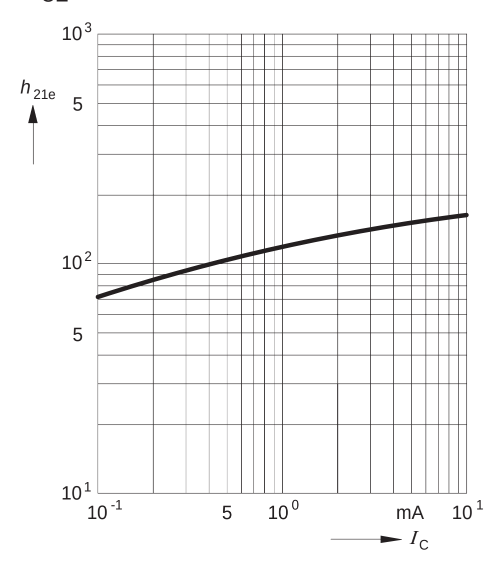
DC current gain $h_{FE} = f\,(I_C)$
V_{CE} = 10V, normalized



RATING CHARACTERISTIC CURVES (CH3904PT)

Short-circuit forward current transfer ratio $h_{21e} = f\,(I_C)$

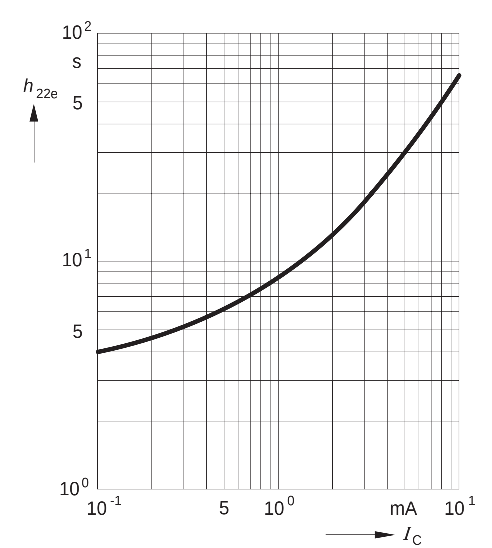
V_{CE} = 10V, f = 1MHz



Open-circuit output admittance

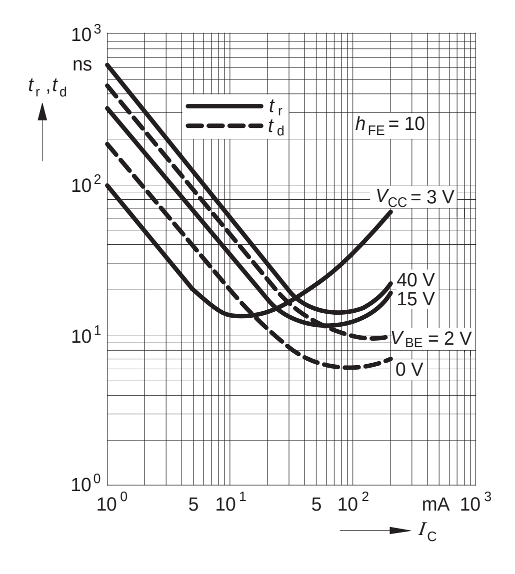
$h_{22e} = f\,(I_C)$

V_{CE} = 10V, f = 1MHz

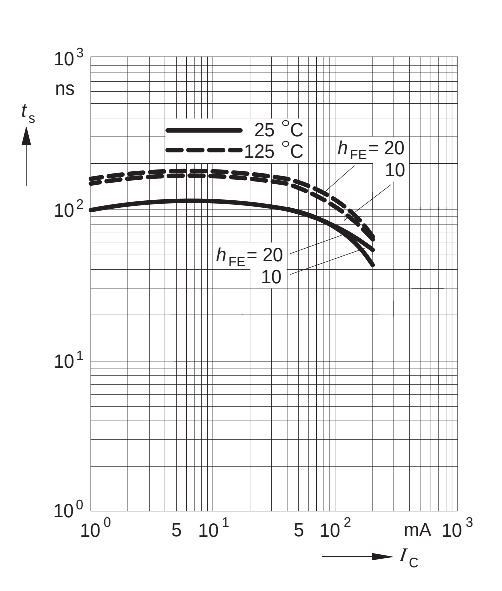


Delay time $t_d = f\,(I_C)$

Rise time $t_r = f\,(I_C)$

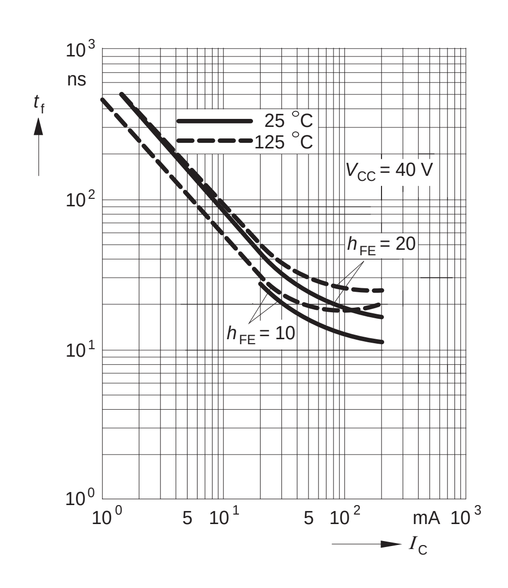


Storage time $t_{stg} = f\,(I_C)$

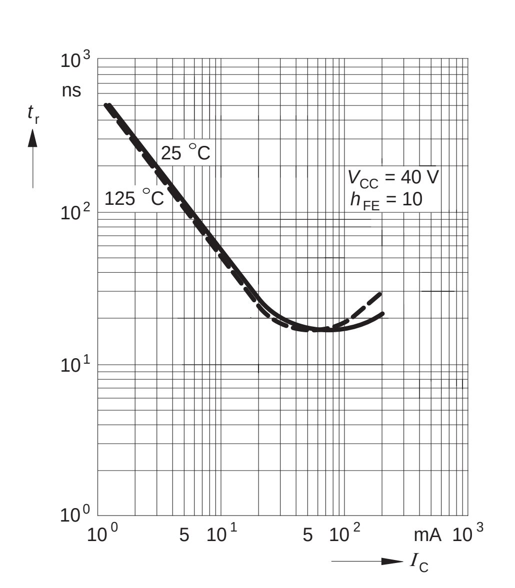


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Fall time $t_f = f(I_C)$



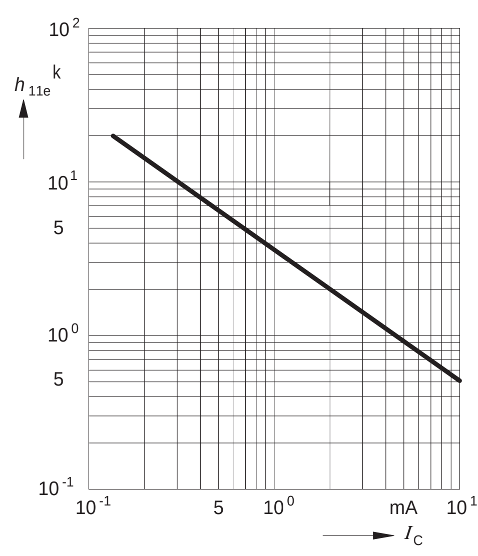
Rise time $t_r = f(I_C)$



Input impedance

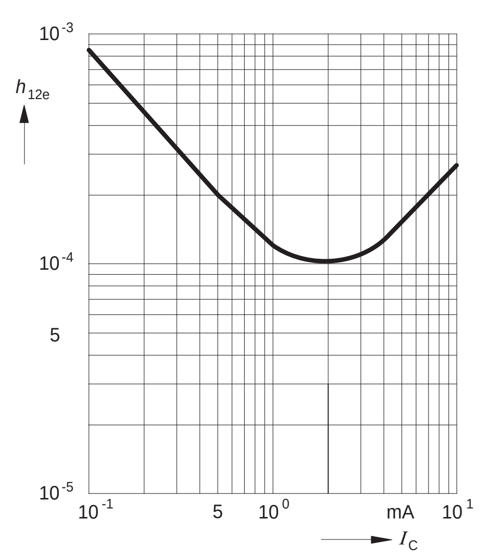
$h_{11e} = f(I_C)$

V_{CE} = 10V, f = 1kHz



Open-circuit reverse voltage transfer ratio $h_{12e} = f(I_C)$

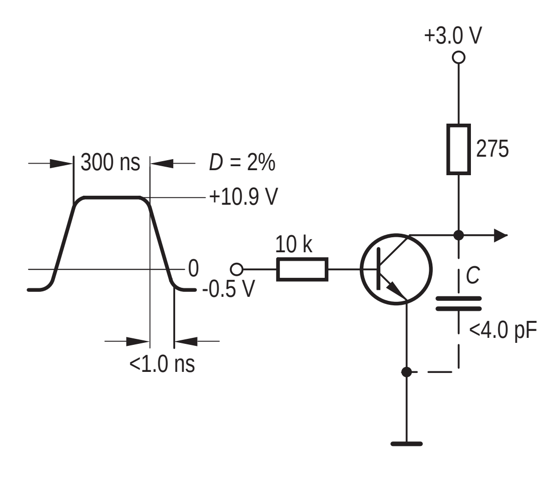
V_{CE} = 10V, f = 1kHz



RATING CHARACTERISTIC CURVES (CH3904PT)

Test circuits

Delay and rise time



Storage and fall time

